

## Claims:

1. A method for partially and selectively hydrogenating a polymer made of at least a conjugated diene monomer having a vinyl content (based on the content of polymerized conjugated diene) of from 20 to 65 %, whereas the content of 1,4 double  
5 bonds is from 35 to 80 % (together being 100%), comprising a hydrogenation step on a solution of the polymer, characterized in that the hydrogenation step is performed in the presence of an iron-containing catalyst whereby a hydrogenated polymer is obtained wherein the vinyl content is reduced to 5 % or less,  
10 whereas the content of 1,4-double bonds is maintained at a level of at least 30 %.
2. The method according to claim 1 for partially and selectively hydrogenating a polymer made of at least a conjugated diene monomer having a vinyl content of from 30 to  
15 60 %, wherein the hydrogenated polymer is obtained wherein the vinyl content is reduced to 3 % or less, whereas the content of 1,4-double bonds is maintained at a level of at least 30 %.
3. The method according to claim 1 or 2 wherein the polymer is a block polymer comprising at least a polymer block of a  
20 vinyl aromatic monomer and a polymer block of a conjugated diene monomer.
4. The method according to any one of claim 1-3 wherein the solution that is subjected to the hydrogenation step contains amounts of lithium alkoxide and iron-containing catalyst of  
25 which the molar ratio [lithium alkoxide]/[iron-containing catalyst] is less than 20.
5. The method according to any one of claims 1-4 wherein the polymer is a substantially completely hydrogen terminated polymer.
- 30 6. The method according to any one of claims 1-5 wherein the solution is substantially free from lithium alkoxide.

7. The method according to any one of claims 1-6 wherein the hydrogenation catalyst residue derived from the iron containing catalyst is extracted from the solution of hydrogenated polymer in the absence of an oxidation agent.

5 8. The method according to claim 7 wherein the hydrogenation catalyst residue is extracted in the absence of oxygen.

9. The method according to claim 7 or 8 wherein the hydrogenation catalyst residue is extracted from the solution of hydrogenated polymer with a solution of an inorganic or  
10 organic acid, or a mixture thereof.

10. The method according to claim 9 wherein the hydrogenation catalyst residue is extracted from the solution of hydrogenated polymer with a solution of an organic acid having 2 to 36 carbon atoms.

15